

**Amendment and Response**

Applicant: Vladimir Abramov

Serial No.: 10/667,561

Filed: September 22, 2003

Docket No.: 05004

Title: UNIVERSAL MULTIFARIOUS GEARBOX OF MUTUALLY DEFINITE UNITS AND METHOD THEREFORE

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**IN THE CLAIMS**

Please amend claims 3, 22, 24, 26, 27, and add claims 28-38 as follows:

1-2. (Cancelled)

3.( Currently Amended)      A gearbox, comprising,

a plurality of gears forming gearsets, each gearset including at least one shaft extending from the gearset, wherein the gearsets are sized having ratios varying by degrees of separation of a common ratio in a geometric sequence of torques,

wherein, the degrees of separation of the common ratio for each pair of shafts is calculated by dividing a total number of gearset combinations of forward speeds in the gearbox by a number of gearsets between a first pair shafts, where the number of gearsets between two shafts is two or more, and then dividing the common ratio from the first pair of shafts by a number of gearsets between the next pair of shafts until all shaft pairs are calculated, and,

the geometric sequence for each pair of shafts ~~includes~~ allows a final gearbox ratio of 1.

4-21.(Cancelled)

22. (Currently Amended)      A gearbox comprising:

a plurality of gears forming gearsets, each gearset including at least one shaft extending from the gearset, wherein the gearsets are sized having ratios varying by degrees of separation of a common ratio in a geometric sequence, wherein

the gearbox includes no more than thirteen gearsets and the gearsets are configured to form the gearbox as comprising 24 forward torques;

R is a common ratio in a geometric sequence, the gearbox further comprising:

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- a first frame member that includes a first gearset unit having gearsets sized to have a common ratio selected from the group consisting of  $1/R^{12}$ ,  $1/R^8$  and  $1/R^6$ ;
- a second frame member that includes a second gearset unit having gearsets sized to have a common ratio selected from the group consisting of  $1/R^4$ ,  $1/R^2$  and  $1/R^3$ ;
- a third frame member that includes a third gearset unit having gearsets sized to have a common ratio of  $1/R$ ; and
- a fourth frame member that includes a reverse pinion idle gear and a reverse gear coupled to a ~~power~~powered source producing ~~24~~12 reverse torques.

23 (Previously Presented) A gearbox comprising:

- a plurality of gears forming gearsets, each gearset including at least one shaft extending from the gearset, wherein the gearsets are sized having ratios varying by degrees of separation of a common ratio in a geometric sequence, wherein the gearbox includes no more than thirteen gearsets and the gearsets are configured to form the gearbox as comprising 24 forward torques;
- wherein R is a common ratio in a geometric sequence, the gearbox further comprising:
  - a frame member comprising 3 units of gearsets including:
    - a first unit having gearsets sized to have a common ratio selected from the group consisting of  $1/R^{12}$  and  $1/R^4$ ;
    - a second unit having gearsets sized to have a common ratio selected from the group consisting of  $1/R^6$  and  $1/R^2$ ; and
    - a third unit having gearsets sized to have a common ratio of  $1/R$ , and a reverse pinion coupled to a power source to produce 12 reverse torques.

24 (Currently Amended) A gearbox comprising:

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a plurality of gears forming gearsets, each gearset including at least one shaft extending from the gearset, wherein the gearsets are sized having ratios varying by degrees of separation of a common ratio in a geometric sequence, wherein  $R$  is a common ratio in a geometric sequence, the gearbox further comprising:

a frame member includes 4 units of gearsets ~~forming and~~ 5 shafts including:

a first unit having gearsets sized to have a common ratio selected from the group consisting of  $R^0$ ,  $1/R^8$  and  $1/R^3$ ;

a second unit having gearsets sized to have a common ratio selected from the group consisting of  $R^0$ ,  $1/R^8$  and  $1/R^3$ ;

a third unit having gearsets sized to have a common ratio selected from the group consisting of  $1/R^8$ ,  $R^0$ , and  $1/R$ ; and

a fourth unit having gearsets sized to have a common ratio of  $R^0$  and  $1/R$ , and a reverse pinion coupled to a power source to produce 24 reverse torques.

25. (Cancelled)

26. (Currently Amended) A gearbox comprising:

a plurality of gears forming gearsets, each gearset including at least one shaft extending from the gearset, wherein the gearsets are sized having ratios varying by degrees of separation of a common ratio in a geometric sequence, wherein  $R$  is a common ratio in a geometric sequence, the gearbox further comprising:

a frame member comprising 4 units of gearsets ~~forming and~~ 5 shafts, including a first input shaft and a second split input shaft such that the gearbox produces an additional 12 forward torques; and

a first unit having a gearsets sized to have a common ratio of  $R^0$ ;

a second unit having 2 gearsets sized to have a common ratio of  $1/R^{12}$ ;

a third unit of gearsets having gearsets sized to have a common ratio selected from the group consisting of  $1/R^4$  and  $1/R^3$ ; and

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a fourth unit of gearsets having gearsets sized to have a common ratio of  $1/R$ , and a reverse pinion coupled to a ~~power-powered~~ source to produce 24 reverse speeds.

27. (~~New~~ Currently Amended) A method of gearbox design comprising:

selecting a number of torques for the gearbox;

determining a number of gearset units based upon a multiplier number representative of the number of torques selected;

providing a number of gearsets in each gearset unit based upon the number of torques selected;

determining a number of shafts equal to the number of gearset units plus one;

determining a degree of separation of a common ratio in a geometric sequence for each ~~for each~~ gearset unit by dividing the number of torques selected by the number of gearsets in a first gearset unit, and then dividing a remainder of the degree of separation of the common ratio by the number of gearsets in a second gearset unit; and

repeating a division step for remaining units until the degree of separation of the common ratio equals one.

28.(New) A gearbox as in claim 3 wherein the geometric sequence of torques is  $1/R^n$ , where  $R$  is common ratio forming a geometric sequence of forward speeds,  $1/R$  is common ratio forming a geometric sequence of forward torques, and  $n$  is the degrees of separation of a common ratio.

29.(New) A gearbox as in claim 3 wherein,

the ~~degrees of separation in of the degree of difference of~~ the common ratio in the geometric sequence for all gearsets ~~ratios between an adjacent pair of shafts~~ is the same.

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30.(New) A gearbox as in claim 3 wherein,  
a first join gear on a second shaft of the gearbox engages a pinion of a first gearset on a first shaft and a gearwheel of a second gearset on a third shaft such that the join gear is part of two gearsets of two adjacent gearset units.

31.(New) A gearbox as in claim 30 wherein,  
a pair of adjacent join gears on a shaft employs an addendum modification ~~shaft shift~~ shift to account for ~~the a difference in gear teeth sizes of four gearsets installed on three adjacent in spacing between the shafts due to different gear sizes in the gearsets~~ such that ~~the all gear teeth all are configured to mesh properly~~.

32.(New) A gearbox as in claim 3 wherein,  
a reverse pinion engages one gearset on an adjacent pair of shafts for providing one or more reverse speeds.

33.(New) A gearbox as in claim 3 wherein,  
a differential is affixed to at least one shaft of an adjacent pair of shafts.

34.(New) A gearbox as in claim 1 wherein,  
The gearbox has at least one frame member.

35.(New) A gearbox as in claim 34 wherein,  
the gearbox has more than one frame member.

36.(New) A gearbox as in claim 3 wherein,  
at least one shaft of an adjacent pair of shafts has at least one outward end extending from the gearbox for connecting to other objects.

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37.(New)      A gearbox as in claim 36 wherein,  
the at least one shaft of the adjacent pairs of shafts has two outward ends and a gear disposed on each of the respective outward ends configured to connect to a powered source and able to be turned over to permit use of a previously unused side of teeth.

38.(New)      A gearbox as in claim 3 wherein,  
the gearbox has at least one split shaft and a clutch coupled to the split shafts.